National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1800b

Eighteen Non-Methane Hydrocarbon Compounds in Nitrogen

(Nominal Amount-of-Substance Fraction – 5 nmol/mol)

This certificate reports the certified value for Lot B.

This Standard Reference Material (SRM) is a primary gas mixture that the amount-of-substance fraction, expressed as concentration [1], may be related to secondary working standards. The SRM is intended for the calibration of instruments used for non-methane hydrocarbon compound (NMHC) determinations and for the development and evaluation of methods used for air monitoring measurements.

This SRM mixture is supplied in a DOT 3AL specification aluminum (6061 alloy) cylinder with a water volume of 6 L. Mixtures are shipped with a nominal pressure exceeding 12.4 MPa (1800 psi), which provides the user with 0.73 m^3 (25.8 ft^3) of useable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-350 brass valve, which is the recommended outlet for this NMHC mixture. NIST recommends that this cylinder **NOT** be used below 2.8 MPa (400 psi).

Certified Value: This SRM mixture has been certified for individual NMHC concentration. The certified values, given in Table 1, apply to the identified cylinder and NIST sample number.

Cylinder Number: NIST Sample Number:

The uncertainty of the certified value includes the estimated uncertainties in the NIST standards, the analytical comparisons of the lot standard (LS) to the primary standards, and the uncertainty of comparing the LS with each of the gas mixtures comprising this lot. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined from experiment and a coverage factor $k = 2$. The true value for the individual NMHC amount-of-substance fraction is asserted to lie in the interval defined by the certified value ± U with a level of confidence of approximately 95 % [2].

Expiration of Certification: This certification is valid until **21 June 2010**, within the measurement uncertainties specified, provided the SRM is handled and stored in accordance with the instructions given in this certificate. However, the certification will be nullified if the SRM is contaminated or modified.

Hydrotest Date: 02/03 **Blend Date:** 04/03

Cylinder and Gas Handling Information: NIST recommends the use of a high-purity, stainless steel, two-stage pressure regulator with a stainless steel diaphragm and CGA-350 outlet to safely reduce the pressure and to deliver this SRM mixture to the instrument. The regulator should be purged several times to prevent accidental contamination of the sample.

The preparation and analytical measurements leading to the certification of this current SRM lot were performed by G.C Rhoderick of the NIST Analytical Chemistry Division.

The overall direction and coordination of the technical work required for certification of this SRM was performed by F.R. Guenther of the NIST Analytical Chemistry Division.

Willie E. May, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Issue Date: 07 October 2004

Robert L. Watters, Jr., Acting Chief
Measurement Services Division

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by C.S. Davis of the NIST Measurement Services Division.

Non-Methane Hydrocarbon Compound	Concentration, nmol/mol (ppb)
Ethane	x.xx ± x.xx
Propane	
Propene	
iso-Butane	
n-Butane	
iso-Butene	
iso-Pentane	
n-Pentane	
1-Pentene	
Hexane	
Heptane	
Benzene	
iso-Octane	
Octane	
Toluene	
Nonane	
ortho-Xylene	
Decane	

Mixture Preparation: The gas mixtures comprising this SRM lot were prepared in accordance with NIST technical procedures by G.C. Rhoderick of the Gas Metrology and Classical Methods Group of NIST. The SRM mixtures were prepared from a high concentration master mixture to be within 30 % of nominal concentration of 5 nmol/mol.

Analytical Methods: Analyses of the NMHC concentrations for this lot of cylinders were conducted by comparing each cylinder mixture to a representative cylinder chosen from the lot, the lot standard (LS), using gas chromatography with flame-ionization detection (GC/FID) and cryogenic preconcentration. Assignment of individual NMHC concentrations to the LS was accomplished by comparison to primary gravimetric standards using GC/FID and cryogenic preconcentration.

VOC Concentration Value Assignment: The certified NMHC concentration for this SRM lot was computed from the assigned concentration for the lot standard and the lot analysis. An analysis of variance indicated that sample-to-sample NMHC concentration differences were statistically significant. This indicates that within the precision of the NIST measurements, all of the cylinders comprising this SRM lot have different NMHC concentrations. Therefore, an individual concentration has been assigned to each sample in the SRM lot.

Stability: Periodic analyses of SRM units from this lot are performed at NIST to monitor stability. If significant changes in the NMHC concentration are observed, the purchaser will be notified. Refer to the "Cylinder and Gas Handling Information" section for proper handling of this SRM.

REFERENCES

[1] Taylor, B.N.; *Guide for the Use of the International System of Units (SI)*; NIST Special Publication 811, 1995 Ed. (1995).

[2] ISO; G*uide to the Expression of Uncertainty in Measurement*; ISBN 92-67-10188-9, 1st ed.; International Organization for Standardization: Geneva, Switzerland (1993); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/.

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.